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The dark side of Iapetus and Hyperion: one and the same?

B. J. Buratti, M. D. Hicks, K. A. Tryka, M. Sittig, R. Newburn, Jr. (Jet Propulsion Laboratory, Caltech)

The origin of the dark hemisphere of Iapetus holds important clues to the interrelationships among small bodies and the satellites of the outer planets. The material on the dark side of Iapetus is believed to be representative of material that is common in the outer solar system and that is rich in organic or prebiotic components. Understanding its origin would offer clues to the transport and alteration of prebiotic material in the solar system. Both of the main classes of theories concerning the genesis of the dark hemisphere of Iapetus - that the material is native to the satellite but has been altered in some way or was erupted onto the surface, or that it has been imported from the outside - have substantial problems.

In this talk we will report on some recent observations obtained on the 200-inch telescope and the Double Spectrograph on Palomar Mountain. We obtained high resolution CCD spectra of both hemispheres of Iapetus, several D-type and C-type asteroids, Hyperion, Phoebe, and the inner large icy Saturnian satellites (the bright hemisphere of Iapetus has similar physical and photometric properties to this latter class of bodies). The purpose of these observations was to investigate the hypothesis that the dark side of Iapetus can be explained as an admixture of end members represented by other astronomical bodies. Our preliminary results support the idea that the dark side of Iapetus is exogenous, and that it is most similar spectrally to the satellite Hyperion (although Hyperion has a higher geometric albedo, and due to its chaotic rotation exhibits no photometric dichotomy).

Work funded by NASA.

Presentation Type: CNP

Category: 16. Smaller Planetary Satellites

Submitter: Bonnie Buratti

Member ID: 11135

Presentor email address: bonnie.buratti@jpl.nasa.gov

Presentor phone: (818)354-7427

Presentor address: Jet Propulsion Lab Mail stop 183-501 Pasadena, CA 91109

Member Type: DPS
